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Objective

Consumer acceptable smoking products with significant reductions in deliveries of Hoffmann analytes and specific measures of biological activity.

Main Assumption

Risks directly related to long-term exposure to tobacco derived tar, and reducing exposure reduces the risks.

Ways To Reduce Exposure

- **Smoke fewer cigarettes**
- **Smoke lower tar cigarettes**
- **Reduce inhalation, or retention of smoke in the lungs**
- **Modify smoke to reduce the relative concentration of hazardous compounds**

Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001

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Ways To Alter Smoke Composition

1. **Don't burn tobacco**
   - **Heat-Don't-Burn concepts**
   - **Burn something instead of, or in addition to tobacco**
2. **Modify the tobacco to reduce selected smoke constituents**
   - **Alter agricultural practices**
   - **Extract constituents in tobacco that are precursors of selected compounds in smoke**
   - **Modify the final cigarette blend**
3. **Modify how tobacco burns**
   - **Vary tobacco column design**
   - **Burn additives**
4. **Modify the smoke through selective filtration**
5. **Dilute the smoke**
   - **With air**
   - **With innocuous compounds such as glycerin and water**

Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001

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1a. Heat-Don't-Burn, Products

- **Pros**
  - **Can give a simple smoke (mostly glycerin and water)**
  - **Low activity in the biological testing selected**
  - **Emit little environmental tobacco smoke**
- **Cons**
  - **Little consumer acceptance in the US, Japan, or Europe**

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Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001

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- **Overall**
  - **Concept most likely to reduce exposure to very low levels**
  - **Poor commercial acceptance unless:**

    Products improved

    Explicit health claims allowed
  - **Most smokers will stay with conventional cigarettes**

Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001

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1b. *Heat-Don't-Burn, Alternative Smoking Materials*

- **Pros**
  - **Can be used in a tobacco blend to dilute the smoke**
  - **Can be used in increase glycerin and water in smoke**
  - **Low smoke potential should resist changes in how the cigarette is smoked**
  - **Have shown reduced activity in biotests**
- **Cons**
  - **Poor physical and smoke quality**
  - **Consumer concern over foreign materials in the cigarette**
- **Overall**
  - **Likely to have a limited role**

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Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001

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2. *Tobacco Modification*

- **Pros**
  - **TSNA's significantly reduced by modifying curing. May be opportunities for other changes**
  - **Changing the blend changes smoke chemistry**
  - **Techniques exist to reduce selected smoke constituents by reducing precursors in tobacco**
  - **Changes in smoke composition likely to resist changes in how the cigarette is smoked**
- **Cons**
  - **Consumer acceptance low if smoke quality degraded**
  - **Established tobaccos and agricultural practices take time to change**

Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001

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- **Overall**
  - **Cigarettes with very low levels of TSNA's will be introduced in 2000. Consumer acceptance will depend in part on the consumer's awareness of the potential health benefits**
  - **Cigarettes with very different blends (and smoke taste) will likely have limited acceptance unless consumers are willing to trade taste for a potential health benefit**
  - **Changing the tobacco and/or agricultural practices introduces non-technical issues:**

    Contract farming versus auction system

    Consumer concerns about modified tobaccos

Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001

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3. *Modify How The Tobacco Burns*

- **Pros**
  - **Cigarette design features that can affect tobacco column combustion are easy to change**
- **Cons**
  - **Limited range of change possible**
  - **Burn modification additives have never shown promising changes**
- **Overall**
  - **Will likely be limited to changes in cigarette design**
  - **Will likely give relatively small benefits**

Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001

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4. *Modify The Smoke Through Selective Filtration*

- **Pros**
  - **Charcoal filters effective at reducing vapor phase smoke constituents**
  - **Charcoal filters can be treated to further reduce several smoke vapor phase constituents**
  - **Other filter additives can be used to remove specific compounds**
- **Cons**
  - **Selective filtration is limited to the smoke vapor phase**
  - **Activated carbon filters are relatively non-selective:**

    Reduce many of the flavors in smoke

    Alter cigarette taste
  - **No practicable method has been found to filter carbon monoxide from smoke**

Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001

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- **Overall**
  - **Carbon filtered cigarettes might eventually be accepted in the US:**

    Consumer is made aware of and understands the potential benefits

    Consumer willing to trade
  - **Other filter additives might reduce some vapor phase constituents with less change in smoke taste**

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Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001

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5. *Dilute The Smoke*

- **Pros**
  - **Filter ventilation is easy to do, and effective in reducing tar deliveries**
  - **Filter ventilation reduces the deliveries of all smoke constituents**
  - **Glycerin levels in cigarettes can be increased**
  - **Dilution with glycerin, etc., reduces the concentration of all TPM compounds. This should resist changes in how the cigarette is smoked**

Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001

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- **Cons**
  - **Tar reductions due to filter ventilation can be influenced by smoking behavior**
  - **The US market for highly ventilated, ultra-low tar products is very limited**
  - **Increasing glycerin on the tobacco will increase acrolein in smoke**
  - **High levels of glycerin give a bland smoke taste, which would affect consumer acceptability**
  - **Levels of glycerin, etc., are limited by machinability, product stability, and burnability**

Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001

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- **Overall**
  - **Filter ventilation gives an overall reduction in exposure for smokers who adopt lower tar products, and should continue to be supported as a strategy for reduced harm**
  - **Glycerin and/or other smoke diluents could be increased gradually (as with carbon filters) to help build consumer acceptance, especially if supported by awareness of the benefits**

Source: https://www.industrydocuments.ucsf.edu/docs/fhdk0001